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SUMMARY

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MOBILE AND SEMI-MOBILE ORE WASHERS FOR THE CONCENTRATION OF STANNIFEROUS ORES

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d'Entreprises Minières

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MOBILE AND SEMI-MOBILE ORE WASHERS FOR THE CONCENTRATION OF STANNIFEROUS ORES.

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Semi-mobile washers are best suited for the exploitation of small ore deposits under the conditions prevailing in developing countries. These washers must as far as possible be standardised and include only sturdy equipment of easy maintenance.

According to the granulometry of cassiterite in detritic ores concentration can be carried out either in sluice washers in jigwashers. When the percentage of 0.5 mm. cassiterite is not high, the sluice system is perfectly suitable for requirements in little developed countries, providing that the hydrographic system is appropriate for this utilisation. Yields of recuperation higher than 90% are obtainable, if the gravel is not too loamy and does not contain much black sands. On the other hand when the proportion of 0.5 mm. cassiterite is considerable, the utilisation of sluices would lead to high losses. Jigs must in that case be used for they are suitable for fine granulometries, if excess water and floating muds are eliminated through anticyclones.

Several typical semi-mobile washers are described with indications of characteristics of the equipment necessary for their practical realisation. According to capacity (from 30 to 150 m3 for 8 hours) and the rate of perfection of these washers, their cost goes from 180,000 B.F. (one unique jig with two compartments) up to 1,912,000 B.F. for a more elaborate washer (vibrating screen, hydrocyclones, sand pump, several jigs with four compartments). The cost of the treatment alone, amortisation included (for 20,000 hours) varies from 11 up to 23 fr. per cubic meter.

Additional recuperation from 0.02 to 0.20 kg. cassiterite per cubic meter treated would then indeed justify the installation of a mechanised washer.

Nevertheless, the importance of the invested capital and the more complicated maintenance of jig washers may lead to adoption of a sluice washer even if the anticipated recuperation is lower.

The fragmentation section of the washer for the handling of primary stanniferous ores generally includes classical crushers (granulators, roll crushers). It is then possible to get crushing of roughly 25 mm. in a single stage, and of 8 mm. in two stages, the latter one enclosed circuit. In the case of such washers, capacity is limited to a maximum of 5 t/h, because of the weight of the comminution engine.

When the low abrasive power of the ore allows utilisation of a percussion crusher, one can even reach a capacity of 15 t/h, with a very simple fragmentation section, including no heavy machines. In some cases, selective crushing can be realised and is then particulary advantageous.

The sluice is not very well suited for the concentration of crushed ore. As, in any case, the fragmentation section requires machines impulled by an appropriate source of energy (Diesel engine or generating set, according to the power needed) utilisation of jigs is not a special complication and this solution should be adopted in all cases of concentration of primary stanniferous ores.

The practical realisation of several typical washers of a capacity varying from 2 to 5 t/h, is explained in detail with the characteristics of the equipment required. The cost price of these washers varies from 322,000 B.F. up to 1,890,000 B.F. according to the degree of fineness of the crushing operation obtained and according to the degree of perfection of the section of concentration.

The expense for treating one ton, amortization included, is from 67 to 86 B.F. When the section of fragmentation includes a percussion crusher it rises to a price of 894,000 up to 2,519,000 F. for a 15 t/h washer in proportion with the flowsheet of the section of concentration. In this case, the cost of the treatment, amortization included, is particularly low : 21.-Fr. and 35.-Fr. per ton respectively.

It also must be noted that the washers as described may be used for the concentration of other high density mineral ores, such as gold (alluvium and eluvium only, wolframite and columbotantalite).

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